



# 2007 Minerals Yearbook

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## BOLIVIA

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# THE MINERAL INDUSTRY OF BOLIVIA

By Steven T. Anderson

Natural gas was Bolivia's leading export and zinc was the leading nonfuel mineral commodity export in 2007. Bolivia was estimated to have produced about 6% of the world's total mine output of tin; 5%, of antimony; 2%, of silver and zinc; slightly greater than 1%, of bismuth and boron; and approximately 1%, of tungsten. Bolivia's proven reserves of natural gas (about 740 billion cubic meters) were second only to those of Venezuela among South American countries. Tin, some antimony, and small amounts of some other mined minerals were refined or further processed into mill products in the country, but most were exported in crude form by rail to ports on the coasts of Argentina, Brazil, Chile, and (or) Peru and then shipped further on to processing facilities located in Asia, Europe, and North America. On average, about 27 million cubic meters per day of Bolivia's production of natural gas was exported to Brazil, and the supply contracts between the two countries were for deliveries of a total of about 30 million cubic meters per day; about 5 million cubic meters per day, on average, of Bolivia's natural gas production was exported to Argentina. The supply contract with Argentina had a clause that promised deliveries of natural gas up to about 7.7 million cubic meters per day (equal to the listed capacity of the Yabog natural gas pipeline from Bolivia to Argentina), subject to availability of natural gas for export after first fulfilling Bolivia's domestic demand requirements and allocating necessary volumes for export to Brazil. This clause in the contract allowed Bolivia to export significantly less than 5 million cubic meters per day to Argentina at times during 2007 when natural gas production was lower (Cauclanis, 2006, 2008b; Petroleum Economist, 2006; Alexander's Gas & Oil Connections, 2007; BP p.l.c., 2008, p. 22; Brooks, 2008; Carlin, 2008a-c; Kostick, 2008; Shedd, 2008).

## Minerals in the National Economy

In 2007, the value of output of the mineral industry of Bolivia accounted for about 12.3% (\$1,630 million<sup>1</sup>) of the country's gross domestic product (GDP) compared with about 11.6% (\$1,340 million) in 2006. The mineral fuels sector accounted for about 6.5% (\$860 million) of the GDP and the mining sector accounted for about 5.8% (\$770 million) in 2007 compared with 6.4% (\$740 million) and 5.2% (\$600 million), respectively, in 2006. Most of the value of production of mineral fuels was accounted for by production of natural gas. In 2007, zinc led all mine-produced minerals in Bolivia, and the value of mined zinc accounted for about 43.4% of the total value of mine production in the country. Zinc was followed by tin (the value of which accounted for 15.1% of the total value of mine production in Bolivia), silver (about 14.8%), gold (12.8%), and antimony (about 6%) (Instituto Nacional de Estadística, Bolivia, 2009, p. 450;

<sup>1</sup>Where necessary, nominal values have been converted from Bolivian bolivianos (Bs) to U.S. dollars (US\$) at an annual average exchange rate of Bs7.75=US\$1.00 for 2007 and Bs7.96=US\$1.00 for 2006. All values are nominal, at current prices, unless otherwise stated.

International Monetary Fund, 2009; Ministerio de Minería y Metalurgia, Bolivia, undated a, p. 6).

In 2007, the total labor force employed in mining was about 57,400 workers compared with 56,800 in 2006. Of the total number of workers in 2007, an estimated 46,700 small-scale, cooperative, and artisanal (SMACA) miners were officially registered with a cooperative through the Government and at least 2,450 SMACA miners were not, compared with 50,200 and approximately 2,450, respectively, in 2006. In 2006 and 2007, about 3,350 people were employed by medium-scale mining operations that used modern mining methods. The remainder were employed by the state-owned mining company Corporación Minera de Bolivia (COMIBOL), which restarted active mining operations in 2006 for the first time since at least 2000 (when the company's last active mining operations were either privatized or closed). COMIBOL employed about 4,900 miners in 2007 compared with 800 in 2006, and most of these new Government employees were transferred from private mining cooperatives that had been working the Huanuni tin mine before the mine's renationalization during the final quarter of 2006. According to the Instituto Nacional de Estadística (INE), Bolivia, the total number of employees in the mineral industry was about 72,400 in 2007 (Instituto Nacional de Estadística, Bolivia, 2009, p. 294; Ministerio de Minería y Metalurgia, Bolivia, undated b).

Total foreign direct investment (FDI) in Bolivia's oil and gas sector was about \$463 million in 2002 and decreased annually until it amounted to \$58 million in 2006. In 2007, FDI in oil and gas was estimated to have increased to about \$131 million even though the Government continued to proceed with a process of nationalizing the sector. In 2002, annual FDI in the mining sector was at its lowest level (\$11.56 million) since at least 1996. FDI then increased to about \$340 million in 2006. In 2007, FDI in the mining sector was estimated to have decreased to about \$308 million, and there were various Government announcements in favor of nationalization of the mining sector, especially during the first half of the year. Public (Government) investment in the oil and gas sector was zero from 2000 through 2004, but increased to about \$4 million in 2005, \$7.3 million in 2006, and \$7.6 million in 2007. Public investment realized in the mining sector was about \$3.3 million in 2005, \$3.1 million in 2006, and \$11.3 million in 2007 (Ecclestone, 2008; Instituto Nacional de Estadística, Bolivia, 2009, p. 630, 686).

## Government Policies and Programs

On May 2, 2007, operations contracts came into effect for private oil and gas companies in accordance with the terms of the Government's program to nationalize the sector. These operations contracts were approved as part of the Hydrocarbons Law of 2005 (law No. 3058 of May 17, 2005), which also allowed for two other new types of contracts between private companies and the state—production-sharing contracts and

association contracts. Under all three types of contracts, oil and gas reserves and any production belongs to the state and the contractor (private company) must deliver the full amount of production to the state-owned oil and gas company, Yacimientos Petrolíferos Fiscales Bolivianos (YPFB). These contracts were designed to replace risk-sharing contracts, which existed under the previous Hydrocarbons Law of 1996 (law No. 2689 of April 30, 1996). In effect, the contractors bore all of the risks and costs for the exploration and production of hydrocarbons under the risk-sharing contracts but were allowed to claim ownership of production and sell it on the open market, subject only to paying royalties and taxes. On May 1, 2006, the President issued Supreme Decree No. 28701 to nationalize the hydrocarbon resources of Bolivia. Following this decree, the Government negotiated 44 operations contracts with existing private producers of oil and natural gas in the country, and the contracts were approved by the Government on April 23, 2007. The new contracts still require the private contractors to bear the risks and costs of production. In addition, however, the private companies cannot claim ownership of oil and gas reserves in the country and must rely on reimbursement by the Government to cover any recoverable costs and (or) be compensated for any profits they might earn (Vargas, 2007).

The main mining law is the Mining Code of 1997 (law No. 1777 of March 17, 1997). In 2007, the mining code was modified to allow for restructured royalties (mining-specific taxes) and other taxes to be charged to mining companies. The new law (law No. 3787 of November 24, 2007) includes measures that require companies to pay an additional income tax of 12.5% if the prices of the minerals produced exceed certain thresholds (specific to each mineral), and that restructure both the royalty rates and the percentages of redistributions (to local, State, or Federal entities) of Government royalty and tax revenue from private mining companies in the country (Ministerio de Minería y Metalurgia, Bolivia, 2007; Apex Silver Mines Ltd., 2008, p. 10)

## Production

Data on mineral production are in table 1. In decreasing value of production in 2007, the six leading nonfuel mineral commodities in Bolivia were zinc, tin, gold, silver, antimony, and lead. Production of lead, silver, and zinc all increased substantially compared with levels of mine production in 2006 mostly owing to the startup of production at the San Cristobal Mine. Production of antimony, gold, and tin decreased during this timeframe. Information concerning the decrease in production of antimony was unavailable mostly owing to a lack of information concerning the operations of SMACA miners. Production of gold decreased mostly owing to decreased production at the Kori Chaca Mine. Production of tin decreased mostly owing to the declining availability and quality of mining equipment at the Huanuni tin mine. COMIBOL reportedly produced about 7,670 metric tons (t) of tin in concentrate in 2007 compared with zero production from 2001 through 2006 (table 1; Newmont Mining Corp., 2007, p. 24; 2008, p. 23; Apex Silver Mines Ltd., 2008, p. 7; Ministerio de Minería y Metalurgia, Bolivia, undated a, p. 1).

## Structure of the Mineral Industry

Table 2 is a listing of the major mineral industry facilities, together with the major owners and (or) operators. The vast majority of the mining workforce in Bolivia consists of SMACA miners, and these small-scale operations often manage to combine to produce more of many mined mineral commodities than the few medium-scale mines. This is despite a low level of technology and artisanal mining methods used by the SMACA miners. In 2007, SMACA miners accounted for about 34% of total mine production of tin compared with 62% in 2006. This was mostly owing to a transfer of ownership of some production at the Huanuni Mine to state-run COMIBOL following nationalization of the mine during the final quarter of 2006. In 2007, SMACA miners also accounted for 100% of the country's mine production of tungsten; about 81%, of antimony; about 46%, of silver; 37%, of gold; 35%, of zinc; and 25%, of lead (Ministerio de Minería y Metalurgia, Bolivia, undated a, p. 1).

With respect to medium-scale mining in the country in 2007, Sinchi Wayra S.A. (a 100%-owned subsidiary of Glencore International AG of Switzerland) was the leading mining company (in terms of revenues from mining, mineral processing operations, and exports), and its leading product was zinc in concentrate. On February 9, 2007, the Government issued Supreme Decree No. 29026, which transferred Glencore's majority interest in the medium-scale tin and antimony smelting complex Complejo Metalúrgico de Vinto S.A. (Vinto) to the Government, effectively nationalizing it. The state-run company that then took over operation of the smelting complex in May was named Empresa Metalúrgica Vinto (table 2; O'Connell and Azzopardi, 2007; Glencore International AG, undated; Ministerio de Minería y Metalurgia, Bolivia, undated c).

## Outlook

By the end of 2009, the San Cristobal Mine is expected to ramp up to an annual average production capacity of about 235,000 metric tons per year (t/yr) of zinc, 82,000 t/yr of lead, and 525 t/yr of recoverable silver contained in separate zinc-silver and lead-silver concentrates. During 2009, the San Bartolome Mine and plant is expected to produce at or near a capacity of about 280 t/yr of silver contained in doré. Production at San Bartolome started up in June 2008. Jindal Steel & Power Ltd. planned to invest \$2.1 billion in El Mutun iron and steel project through 2014, but it was not clear how much iron or steel the company would be able to produce during this construction phase. The company planned for the eventual designed capacity at El Mutun to be 10 million metric tons (Mt/yr) of iron ore pellets, 6 Mt/yr of sponge iron, and 1.7 Mt/yr of crude steel. Through the end of 2007, Atlas Precious Metals Inc. had not guaranteed its participation in a joint venture with COMIBOL to reactivate the Karachipampa smelter, but Atlas was still planning to make the necessary payment to the Government sometime during the first quarter of 2008. If renovated according to Atlas's plan, the company estimated that the plant could have a capacity to produce about 70,000 t/yr of zinc metal (slabs), 30,000 t/yr of lead metal (ingots), and 310 t/yr of silver metal. Karachipampa could also produce 140,000 t/yr of sulfuric

acid (Apex Silver Mines Ltd., 2008, p. 6-7; Jindal Steel & Power Ltd., 2008, p. 5, 12; Kosich, 2008; Coeur d'Alene Mines Corp., 2009, p. 2, 22; Atlas Precious Metals Inc., undated).

According to the Fraser Institute, surveyed companies considered Bolivia to have the most substantial barriers to investment in the crude petroleum and natural gas sector among 54 worldwide jurisdictions, and the Fraser Institute's ranking of the country as a desirable destination for investment by private companies in the mining sector continued to decrease in 2007. To maintain or increase production by the mineral industry, substantial public investment (through COMIBOL and YPFB) could be required to supplement private investment. In 2007, public investment in the oil and gas sector was 5.8% of FDI in the same sector, and public investment in the mining sector was 3.3% of FDI in that sector. State-run *Petróleos de Venezuela S.A. (PDVSA)* of Venezuela agreed to form joint ventures with YPFB to provide both investment and expertise to help expand natural gas and petroleum reserves in Bolivia. Production of natural gas and crude petroleum increased slightly in 2007 and FDI in the sector increased somewhat, as private companies adjusted to the new operating contracts and to doing business with YPFB. After many years of decreasing investment in the oil and gas sector, however, it is uncertain whether the country will be able to maintain or exceed 2007 levels of production (Harris, 2007; Vargas, 2007; Angevine and Thomson, 2008, p. 5, 12; Beltran, 2008; Cauclanis, 2008a; Garcia, 2008; McMahon and Vidler, 2008, p. 5, 21; Instituto Nacional de Estadística, Bolivia, 2009, p. 630, 686).

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TABLE 1  
BOLIVIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2003	2004	2005	2006	2007
<b>METALS<sup>3</sup></b>					
<b>Antimony:</b>					
Mine output, Sb content	2,585	2,633	5,204	5,460	3,881
Metal, including Sb content of trioxide	310	386	2,941	2,320 <sup>e</sup>	2,862
Arsenic, mine output, arsenic trioxide, arsenic sulfide	276	168	120	90 <sup>r</sup>	--
<b>Bismuth:</b>					
Mine output, Bi content	72	62	44	155 <sup>r</sup>	147
Metal, smelter	51	33	--	40 <sup>e</sup>	(4)
<b>Copper:</b>					
Mine output, Cu content	182	576	35	218	606
Metal, smelter, primary	--	441	--	--	--
Gold, mine output, Au content <sup>5</sup>	9,362	6,951	8,871	9,628	8,818
<b>Lead:</b>					
Mine output, Pb content	9,740	10,267	11,231	11,955	22,798
Metal, smelter, primary	50	84	33	85 <sup>e</sup>	301
<b>Silver:</b>					
Mine output, Ag content <sup>6</sup>	465,309	406,925	420,300	472,208 <sup>r</sup>	524,989
Refined	28,045	10,768	18,221	22,600 <sup>e</sup>	23,657
Tantalum, tantalite	10,070	--	4,080	8,000 <sup>r,e</sup>	3,914
<b>Tin:</b>					
Mine output, Sn content	16,755	17,569	18,640	17,669	15,972
Metal, smelter	12,836	13,627	13,841	14,100 <sup>e</sup>	12,251
Alloys, Sn-Pb alloyed metal	471	480	498	1,030 <sup>e</sup>	473
Tungsten, mine output, W content	441	403	531	868	1,107
Zinc, mine output, Zn content	145,490 <sup>r</sup>	147,430 <sup>r</sup>	159,502	172,747	214,053
<b>INDUSTRIAL MINERALS</b>					
Barite	1,851	5,774	11,379	8,943 <sup>r</sup>	8,245
Bentonite	227	548	590	-- <sup>r,e</sup>	-- <sup>e</sup>
Borax	--	--	--	56 <sup>e</sup>	-- <sup>e</sup>
Boric acid	--	--	13,584	12,136 <sup>r</sup>	15,032
Cement, hydraulic	1,138	1,276	1,440	1,636	1,739
<b>Gemstones, rough</b>					
Amethyst	144,354	199,615	89,092	175,715,176 <sup>r,7</sup>	671,587,996 <sup>7</sup>
Ametrine	6	5	20,011	33,675 <sup>r</sup>	8,933
Quartz, pink	11,422	49,323	49,210	3,756 <sup>r</sup>	38
Emerald	--	--	7,742	2,219 <sup>r</sup>	--
Gypsum, crude	--	28	26	617 <sup>r</sup>	4,458
<b>Salt, natural, all types<sup>c</sup></b>					
Of which, rock salt	2,271	869	552	688 <sup>r</sup>	1,545
<b>Stone, natural:</b>					
Flint	--	2,000	4,174	4,427 <sup>r</sup>	25
Granite	58	--	368	119 <sup>r</sup>	205
Limestone as dimension stone	--	21	--	--	(4)
Marble	281	327	102	102 <sup>r</sup>	81
Slate (pizarra)	228	314	297	192 <sup>r</sup>	233
Sulfur, native	--	--	--	3 <sup>r</sup>	--
Ulexite	109,545	68,031	62,604	50,727 <sup>r</sup>	79,531
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
<b>Gas, natural:</b>					
Gross	10,202	12,673	14,672	14,689 <sup>r</sup>	15,230 <sup>p</sup>
Marketable	7,398	10,257	12,536	13,434 <sup>r</sup>	14,301 <sup>p</sup>
Natural gas liquids <sup>e</sup>	4,100	4,500	4,600	4,600 <sup>r</sup>	4,800

See footnotes at end of table.



TABLE 1—Continued  
BOLIVIA: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2003	2004	2005	2006	2007	
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum:						
Crude	thousand 42-gallon barrels	12,223	14,192	15,417	14,882 <sup>r</sup>	15,027 <sup>p</sup>
Refinery products:						
Liquefied petroleum gas	do.	695	791	864	855 <sup>r</sup>	895 <sup>p</sup>
Gasoline:						
Aviation	do.	21	23	25	28 <sup>r</sup>	32 <sup>p</sup>
Motor	do.	3,450	3,867	3,726	3,877 <sup>r</sup>	4,558 <sup>p</sup>
Jet fuel	do.	944	946	1,104	1,076 <sup>r</sup>	992 <sup>p</sup>
Kerosene	do.	166	150	151	153 <sup>r</sup>	131 <sup>p</sup>
Distillate fuel oil	do.	3,488	4,419	4,450	4,615 <sup>r</sup>	4,880 <sup>p</sup>
Lubricants:						
Oil, automotive	do.	62	78	83 <sup>r</sup>	102 <sup>r</sup>	105 <sup>p</sup>
Oil, industrial	do.	2	5	7 <sup>r</sup>	10 <sup>r</sup>	8 <sup>p</sup>
Greases <sup>8</sup>	do.	2	3	3	4 <sup>r</sup>	3 <sup>p</sup>
Asphalt <sup>8</sup>	do.	13	14	15 <sup>r</sup>	15 <sup>r</sup>	13 <sup>p</sup>
Paraffin oil <sup>8</sup>	do.	6	5	3 <sup>r</sup>	1 <sup>r</sup>	-- <sup>p</sup>
Total	do.	8,849	10,301	10,431 <sup>r</sup>	10,736 <sup>r</sup>	11,617 <sup>p</sup>

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>p</sup>Preliminary. <sup>r</sup>Revised. do. Ditto. -- Zero.

<sup>1</sup>Table includes data available through January 31, 2009.

<sup>2</sup>In addition to the commodities listed, a variety of industrial minerals (clays, crushed and broken stone, dimension stone, and sand and gravel) are produced, but available information is inadequate to make reliable estimates of output.

<sup>3</sup>Unless otherwise specified, data represent actual production by Corporación Minera de Bolivia and small- and medium-sized mines.

<sup>4</sup>Less than 1/2 unit.

<sup>5</sup>Includes production of metallic gold.

<sup>6</sup>Includes production of metallic silver.

<sup>7</sup>Includes production by previously unregistered miners, whose production was not officially accounted for prior to 2006.

<sup>8</sup>Reported figures were converted from metric tons to equivalent barrels.

TABLE 2  
BOLIVIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity <sup>c</sup>
Antimony		Empresa Minera Unificada S.A. (EMUSA) (private, 100%)	Caracota, Chilcobija, and Espiritu Santo Mines, Potosi Department	1,100.
Do.		Small-scale mining operations and cooperatives (private, 100%)	San Jose Mine, Oruro Department; Mines in Caracota District, Nor Chichas, Quijarro, and Sud Chichas Provinces, Potosi Department	4,300.
Antimony, refined		Empresa Metalúrgica Vinto (Government, 100%)	Vinto antimony smelter, <sup>1</sup> Carretera Vinto, Oruro Department	60.
Do.		Fundestaño de Oruro S.A. (Empresa Minera Unificada S.A., 100%)	City of Oruro, Oruro Department	1,100.
Antimony trioxide		Empresa Minera Bernal Hermanos S.A. (private, 100%)	Palala smelter, Tupiza, Potosi Department	1,900.
Bismuth, refined		Empresa Metalúrgica Vinto (Government, 100%)	Vinto smelting complex, <sup>1</sup> Carretera Vinto, Oruro Department	90.
Cement	thousand metric tons	Sociedad Boliviana de Cemento S.A. (SOBOCE) (Grupo Cementos de Chihuahua S.A. de C.V., 47.02%, and other private, 52.98%)	El Puente (near city of Tarija), EMISA (near city of Oruro), VIACHA (near city of La Paz), and WARNES (near city of Santa Cruz) plants	865 cement; 640 clinker.
Do.	do.	Fábrica Nacional de Cemento S.A. (Sociedad Boliviana de Cemento S.A., 33.34%; Municipal Government of Sucre, 33.33%; Universidad San Francisco Xavier de Chuquisaca, 33.33%)	Cal Orcko industrial complex near city of Sucre, including grinding plant, and FANCESA cement plant near city of Chuquisaca	375 cement; 360 clinker.
Do.	do.	Cooperativa Boliviana de Cemento Ltda. (COBOCE)	Irpa Irpa Plant, near city of Cochabamba	330 clinker.
Copper		Compañía Minera PAS (Bolivia) S.A. (Pan American Silver Corp., 95%, and Empresa Minera Unificada S.A., 5%)	San Vicente Mine, Potosi Department	130.
Gold	kilograms	Empresa Minera Paititi S.A. {Orvana Minerals Corp. [Fabulosa Mines Ltd. (Minera S.A., 100%), 52.5%, and other private, 47.5%], 100% }	Don Mario Mine, Chiquitos Province, Santa Cruz Department	2,500.
Do.	do.	Golden Eagle International Inc. (private, 100%)	Cangalli Mine, Santa Cruz Department	150.
Do.	do.	Grupo Minero La Roca S.A. (private, 100%)	La Paz Department	200.
Do.	do.	Mining Cooperatives (private, 100%)	Tipuani, Guanay, Mapiri, Huayta, Kaka and Teoponte Rivers, La Paz Department	4,350.
Gold-silver doré, bullion	do.	Empresa Minera Inti Raymi S.A. (Newmont Mining Corp., 88%, and Empresa Minera Unificada S.A., 12%)	Kori Chaca open pit mine and Kori Kollo leaching plant, near city of Oruro	3,200 gold; 4,500 silver.
Lead		Sinchi Wayra S.A. (Glencore International AG, 100%)	Bolivar, Colquechaquita, Don Diego, Porco, and San Lorenzo Mines, Oruro and Potosi Departments	15,000.
Do.		Minera San Cristóbal S.A. (Apex Silver Mines Ltd., 65%, and Sumitomo Corp., 35%)	San Cristobal Mine, southwestern Bolivia	82,000.
Do.		Empresa Minera La Solución S.A. (Apogee Minerals Ltd., 100%)	Asientos and Monserrate lead-silver-zinc mines, Cochabamba Department	610.
Do.		Small-scale mining operations and cooperatives (private, 100%)	Cerro Rico Mine, Potosi Department, and in areas immediately surrounding the San Cristobal Mine	4,700.
Lead, metal		Empresa Metalúrgica Vinto (Government, 100%)	Vinto smelting complex, <sup>1</sup> Carretera Vinto, Oruro Department	120.
Do.		Empresa Metalúrgica de Karachipampa (Atlas Minerals Inc., 65%, and Corporación Minera de Bolivia, 35%)	Karachipampa lead-silver smelter, and zinc refinery, Potosi Department (inactive in 2007)	30,000.

See footnote at end of table.

TABLE 2—Continued  
BOLIVIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity <sup>c</sup>
Natural gas million cubic meters	Operated by Empresa Petrolera Andina S.A. (Repsol YPF, S.A., 50%; Previsión and Futuro Pension Funds, 24.46% each; other Bolivian Pension Funds, 1.08%), and owned by Empresa Petrolera Andina, S.A., 50%; Petróleo Brasileiro S.A., 35%; Total S.A., 15%	Los Sauces, Rio Grande, Sirari, Vibora, and Yapacani fields, Santa Cruz Department	2,700.
Do.	do. Operated by Repsol YPF, S.A., and owned by BG Group plc., 37.5%; Repsol YPF, S.A., 37.5%; Pan American Energy LLC, 25%	Margarita field, Caipipendi Block, Tarija Department; Paloma field, Mamore Block, Cochabamba and Santa Cruz Departments	1,300.
Do.	do. Operated by Petróleo Brasileiro S.A. (Petrobras) (Brazilian Government, 32.2%, and private, 67.8%), and owned by Empresa Petrolera Andina S.A., 50%; Petróleo Brasileiro S.A., 35%; Total S.A., 15%	Sabalo field, San Antonio Block; San Alberto field and Block, Tarija Department	7,200.
Do.	do. Operated by Empresa Petrolera Chaco S.A. (Pan American Energy LLC [BP p.l.c., 60%, and BRIDAS Corp., 40%] 100%), and owned by Empresa Petrolera Chaco S.A., 50%, and BBVA and Futuro de Bolivia pension funds, 50%	Vuelta Grande field, Chuquisaca Department; Bulo Bulu, Carrasco and Kanata fields, on the border of Cochabamba and Santa Cruz Departments	2,200.
Do.	do. Operated and owned by BG Group plc., 100%	La Vertiente, Escondido and Taiguati fields, La Vertiente Block; Los Suris field and block, all in Tarija Department	630.
Do.	do. Operated by Pluspetrol Bolivia Corporation S.A. (owned by Pluspetrol S.A., 100%)	Bermejo and Madrejones fields, Tarija Department; Tacobo field, Santa Cruz Department	520.
Do.	do. Operated by Vintage Petroleum Boliviana Ltda. (owned by Occidental Petroleum Corp., 100%)	Chaco Sur and Ñupuco fields, Tarija Department; Naranjillos field, Santa Cruz Department	350.
Petroleum thousand 42-gallon barrels	Operated by Empresa Petrolera Andina S.A. (Repsol YPF, S.A., 50%; Previsión and Futuro Pension Funds, 24.46% each; other Bolivian Pension Funds, 1.08%), and owned by Empresa Petrolera Andina, S.A., 50%; Petróleo Brasileiro S.A., 35%; Total S.A., 15%	Los Sauces, Rio Grande, Sirari, Vibora, and Yapacani fields, Santa Cruz Department	2,100.
Do.	do. Operated by Petróleo Brasileiro S.A. (Petrobras) (Brazilian Government, 32.2%, and private, 67.8%), and owned by Empresa Petrolera Andina S.A., 50%; Petróleo Brasileiro S.A., 35%; Total S.A., 15%	Sabalo field, San Antonio Block; San Alberto field and Block, Tarija Department	7,500.
Do.	do. Operated by Empresa Petrolera Chaco S.A. (Pan American Energy LLC [BP p.l.c., 60%, and BRIDAS Corp., 40%] 100%), and owned by Empresa Petrolera Chaco S.A., 50%, and BBVA and Futuro de Bolivia pension funds, 50%	Vuelta Grande field, Chuquisaca Department; Bulo Bulu, Carrasco and Kanata fields, on the border of Cochabamba and Santa Cruz Departments	2,900.
Do.	do. Operated by Repsol YPF, S.A., and owned by BG Group plc., 37.5%; Repsol YPF S.A., 37.5%; Pan American Energy LLC, 25%	Margarita field, Caipipendi Block, Tarija Department; Paloma field, Mamore Block, Cochabamba and Santa Cruz Departments	5,000.
Do.	do. Operated and owned by BG Group plc., 100%	La Vertiente, Escondido and Taiguati fields, La Vertiente Block; Los Suris field and block, all in Tarija Department	610.
Do.	do. Operated by Pluspetrol Bolivia Corporation S.A. (owned by Pluspetrol S.A., 100%)	Bermejo and Madrejones fields, Tarija Department; Tacobo field, Santa Cruz Department	160.
Do.	do. Operated by Vintage Petroleum Boliviana Ltda. (owned by Occidental Petroleum Corp., 100%)	Chaco Sur and Ñupuco fields, Tarija Department; Naranjillos field, Santa Cruz Department	140.

See footnote at end of table.



TABLE 2—Continued  
BOLIVIA: STRUCTURE OF THE MINERAL INDUSTRY IN 2007

(Metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity <sup>c</sup>
Silver	Small-scale mining operations and cooperatives (private, 100%)	Candelaria and other mines, Cerro Rico deposit, as well as in areas immediately surrounding the San Bartolome Mine (under construction), Oruro and Potosi Departments	220.
Do.	Minera San Cristóbal S.A. (Apex Silver Mines Ltd., 65%, and Sumitomo Corp., 35%)	San Cristobal Mine, southwestern Bolivia	525.
Do.	Sinchi Wayra S.A. (Glencore International AG, 100%)	Bolivar, Colquechaquita, Don Diego, Porco, and San Lorenzo Mines, Oruro and Potosi Departments	200.
Do.	Compañía Minera PAS (Bolivia) S.A. (Pan American Silver Corp., 95%, and Empresa Minera Unificada S.A., 5%)	San Vicente Mine, Potosi Department	22.
Do.	Empresa Minera La Solución S.A. (Apogee Minerals Ltd., 100%)	Asientos and Monserrate lead-silver-zinc mines, Cochabamba Department	2.
Silver, metal	Empresa Metalúrgica de Karachipampa (Atlas Minerals Inc., 65%, and Corporación Minera de Bolivia, 35%).	Karachipampa lead-silver smelter, and zinc refinery, Potosi Department (inactive in 2007)	310.
Do.	Empresa Metalúrgica Vinto (Government, 100%)	Vinto smelting complex, <sup>1</sup> Carretera Vinto, Oruro Department	2.
Tin	Corporación Minera de Bolivia (COMIBOL) (Government, 100%)	Huanuni Mine, Dalence Province, Oruro Department	8,000.
Do.	Compañía Minera Colquiri S.A. (Glencore International AG, 51%, and Actis Capital LLP, 49%)	Colquiri tin and zinc mine, Inquisivi Province, La Paz Department	3,000.
Do.	Empresa Minera Barrosquira Ltda. (private, 100%)	Caracoles Mine, Inquisivi Province, La Paz Department	500.
Do.	Small-scale mining operations and cooperatives (private, 100%)	Caracoles, Huanuni, Viloco, and other current or former COMIBOL mines, in Oruro, Potosi, and La Paz Departments	5,500.
Tin, refined	Fundestación de Oruro S.A. (Empresa Minera Unificada S.A., 100%)	City of Oruro, Oruro Department	3,000.
Do.	Empresa Metalúrgica Vinto (Government, 100%)	Vinto smelting complex, Carretera Vinto, Oruro Department	12,000.
Tin-lead alloys	do.	do.	200.
Tungsten, W content	Small-scale mining operations and cooperatives (private, 100%)	Bolsa Negra, Enramada, Reconquistada Mines, near the former International Mining Company's Chojilla Mine, Sud Yungas Province; Chambilaya and Chicote Grande Mines, Inquisivi Province; Mercedes, San Antonio, Ucumarini Mines, Larecaja Province, La Paz Department	580.
Zinc	Sinchi Wayra S.A. (Glencore International AG, 100%)	Bolivar, Colquechaquita, Don Diego, Porco, and San Lorenzo Mines, Oruro and Potosi Departments	240,000.
Do.	Minera San Cristóbal S.A. (Apex Silver Mines Ltd., 65%, and Sumitomo Corp., 35%)	San Cristobal Mine, southwestern Bolivia	235,000.
Do.	Small-scale mining operations and cooperatives (private, 100%)	Cerro Rico Mine, Potosi Department, and in areas immediately surrounding the San Cristobal Mine	36,100.
Do.	Compañía Minera Colquiri S.A. (Glencore International AG, 51%, and Actis Capital LLP, 49%)	Colquiri tin and zinc mine, Inquisivi Province, La Paz Department	14,000.
Do.	Compañía Minera PAS (Bolivia) S.A. (Pan American Silver Corp., 95%, and Empresa Minera Unificada S.A., 5%)	San Vicente Mine, Potosi Department	2,000.
Do.	Empresa Minera La Solución S.A. (Apogee Minerals Ltd., 100%)	Asientos and Monserrate lead-silver-zinc mines, Cochabamba Department	1,300.
Zinc, refined	Empresa Metalúrgica de Karachipampa (Atlas Minerals Inc., 65%, and Corporación Minera de Bolivia, 35%).	Karachipampa lead-silver smelter, and zinc refinery, Potosi Department (inactive in 2007)	70,000.

<sup>c</sup>Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto.

<sup>1</sup>No reported production of refined antimony or bismuth, nor of lead or silver metal (unless in alloys) in 2007 (Ministerio de Minería y Metalurgia, Bolivia, [undated], Cuadro No. 6, Boletín estadístico minero metalúrgico—Enero–Diciembre, 2007: La Paz, Bolivia, Ministerio de Minería y Metalurgia, no. 222).